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ABSTRACT

This paper examines a broad set of beliefs about achievement and the relationship of those beliefs to performance and future plans in mathematics and English. The two main purposes of the analysis are (1) to assess gender and grade-level differences in children's achievement beliefs as they proceed through junior and senior high school, and (2) to assess an expectancy-value model of children's achievement beliefs that specifies how those beliefs relate to children's course performance and course enrollment decisions, in order to more clearly identify the achievement beliefs that are critical mediators of performance and persistence in math and English. Children in grades 5 through 12 completed questionnaires assessing their achievement beliefs and attitudes in mathematics and English over a 2-year period. Results of the analysis showed that (1) boys had higher expectancies than girls for both current and future math courses, while girls had more positive beliefs about English; and (2) children's beliefs about math were less positive at each successive grade level, whereas their interest in English increased at higher grade levels. Many of the major tenets of the model received support. Children's expectancies for success and particularly their task value relate to their intentions to take more math, whereas ability perceptions are strongly related to both expectancies and values. Analyses of English beliefs showed similar results. Tables showing these results are included, along with a diagram of the expectancy-value model of student attitudes. (TE)

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# Relationships Between Ability Perceptions, Other Achievement-related Beliefs, and School Performance

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The other papers in this symposium have focused on one important achievement-related belief, ability perceptions, and looked in depth at various factors influencing children's ability perceptions. The focus of this paper is somewhat different. Here a broader set of achievement beliefs is examined, and the relationships of those beliefs to performance and future plans in mathematics and English are assessed. There are two main purposes of these analyses. The first is to assess further the decline in children's achievement beliefs that has been observed to occur as children proceed through junior and senior high school. The second is to assess a model of children's achievement beliefs which specifies how those beliefs relate to children's course performance and course enrollment decisions, in order to more clearly identify the achievement beliefs which appear to be critical mediators of performance and persistence in math and English.

Various studies indicate that children's attitudes toward school, beliefs about their academic ability, and valuing of school become less positive after the elementary school years (see Eccles et al., in press. and Simmons et al., 1979, for reviews). For instance, children report more anxiety in secondary school (Hill and Wigfield, in press), have lower intrinsic motivation (Gottfried, 1981), and a less positive general self-concept (Conner, 1978). In a comprehensive study of achievement beliefs, (Eccles) Parsons and her colleagues (1983) assessed 650 5th through 12th grade students' beliefs about mathematics and English, measuring many constructs including ability perceptions, task difficulty perceptions, the perceived value of each subject, expectations for future performance in each subject, and a host of others. Results showed that children were more negative and pessimistic about math at the later grades on nearly all of the measured constructs, and that girls tended to be more negative than boys.

These age differences were more pronounced in math than in English, a finding also reported by other investigators (Brush, 1980). Though there is this subject area difference within the academic domain, it appears that children's increasing pessimism is confined primarily to the academic domain. Studies that have compared children's beliefs and attitudes about things such as

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sports and social skills with children's academic attitudes have found that children's beliefs in these other domains do not become more negative during the secondary school years (Buhrmester, 1980; Prawatt et al., 1979; Simmons et al., 1973). Thus it is achievement attitudes and beliefs where the problem lies.

What explains this decline in achievement attitudes? Simmons and her colleagues have argued that the transition to junior high forces many students to re-assess their attitudes, beliefs and self-perceptions, since the junior high school environment is so different than the elementary school environment, and so imposes different demands on students. These investigators also note that at this time many students are undergoing the major changes associated with puberty, which increases the likelihood that a reappraisal will occur. Others (Eccles et al., in press) have pointed to more particular aspects of the junior high environment that could lead students to hold less positive achievement beliefs and attitudes. For instance, they argue that although junior high school students are more knowledgeable, skillful and competent than elementary school students, in many junior high schools they have little control or autonomy over classroom proceedings. Also, social comparison and competition become more intense in junior high, and grades and testing exert more pressure because those evaluations begin to have strong implications for children's futures. These latter changes focus children's attention on their ability and outperforming others rather than on task mastery, which creates difficulty for many students, particularly for those not doing well (see Nicholls, 1979).

It seems clear, then, that there is a decline in children's achievement beliefs and attitudes, particularly in mathematics, that is related to changes in the school environment. One way to more clearly understand this decline is to assess which of children's achievement beliefs most strongly mediate their performance and persistence in school. Eccles and her colleagues have developed an expectancy-value model of achievement beliefs (see Figure 1) which posits that achievement behavior and choice is most directly mediated by the expectancy one has for doing well on the task, along with the value attached to doing well. These beliefs are each in turn influenced by a variety of other mediators, including task-specific beliefs such as ability perceptions and task difficulty perceptions, and more general self-schemata like locus of control and sex-role identity. Another important influence is perceptions of one's socializers beliefs. The various components of this model are discussed next.

Expectancies. Expectancies have played an important role in decision theory, achievement motivation theory, and attribution theory (e.g., Atkinson, 1964; Edwards, 1954; Weiner, 1979). Many different laboratory studies have shown a link between expectancies for success and task choice, as have field-based



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studies of students' course enrollment decisions. Children who are confident they can do well are more likely to enroll in advanced math classes (Sherman, 1979). Thus expectancies are proposed to be a critical direct mediator of children's intentions to take advanced courses, as well as their performance in those courses.

Eccles et al. propose that expectancies themselves are most directly influenced by ability perceptions, and task difficulty beliefs. As we have heard today, and as others have emphasized (e.g., Nicholls, 1976), ability perceptions are a key component of children's achievement beliefs. Children with positive ability perceptions should have more positive expectancies. On the other hand, task difficulty may show an inverse relationship with expectancies. When students are given a choice about which courses to enroll in, they may try to avoid courses they think will be too hard for them, since they will fear doing poorly.

Several different constructs are proposed to be more indirect mediators of expectancies, including such things as children's interpretations of previous outcomes, and their perceptions of their parents' and teachers' beliefs about them. These interpretations of previous outcomes and perceptions of socializers' beliefs influence children's more general self-perceptions, such as the extent to which they feel responsible for their achievement outcomes, or their locus of control. Another of these general self-perception variables posited to indirectly mediate expectancies and values is the child's sex role identity. This variable is discussed when we discuss the mediators of task value. So the more task specific beliefs are proposed as direct mediators of expectancies, whereas these more general self-perceptions are indirect mediators.

Values. Turning to task value, Eccles et al. have proposed that there are three critical components of task value. The first is attainment value, or the importance of doing well, which refers to how the task relates to the student's needs and self-perceptions. The second is intrinsic value, which simply refers to the inherent interest of the task for the student. Third is utility value, which is the usefulness of the task for future goals. Utility value in particular has been shown to relate to students' course selections (Fennema and Sherman, 1977). A construct related to value is the cost of the task; how much effort will it take, and is that effort worth it?

The mediators of task value have not been as well specified as have those of expectancies, since task value has been a relatively neglected construct in the achievement motivation literature. Ability perceptions and task difficulty beliefs are proposed as direct mediators of task value; for instance, children likely value tasks on which they have higher ability, and overly difficult tasks may be valued less. One important proposed indirect mediator is sex-role identity, since the child's sex-role has a major influence on which school subjects



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will be viewed as appropriate. Boys in particular view math as a male domain, and so math should have greater attainment value for boys. On the other hand, females often believe most math careers are masculine (Boswell, 1979; Fennema and Sherman, 1977), and this could mean that math has less utility value for them.

In sum, Eccles et al. have developed an expectancy-value model of achievement choice and performance, and proposed different mediators of expectancies for success and task value. In an initial test of the model done in the study described earlier, they found support for many of the links in the model. Task value was a stronger predictor of intentions to take more math than was expectancies for success. However, the variance in expectancies was explained better by the proposed mediators of that variable than was the the variance in task value.

## The Present Study

This study is a follow-up to the Eccles et al. study we have been discussing. The study was conducted in a different locale than the first study, but many of the measures were quite similar. Children in grades 5 through 12 (N = 740) completed questionnaires assessing their achievement beliefs and attitudes in mathematics and English. The questionnaires were given once each year over a two-year period, and tapped many different achievement beliefs in both math and English. These measures include: children's perceptions of their ability and performance in math and English, the value of each subject, their expectancies for success in current and future courses, perceptions of current and future difficulty of math and English, how much effort is needed to do well in each, and a variety of others. Most of these constructs were measured by several individual items. Composite measures of children's ability perceptions, task value, and task difficulty were obtained by summing over several different scales. Certain more general self-perception measures were obtained, including children's locus of control and sex-role identity. In the math area, children were asked a variety of questions tapping their perceptions of their socializers' beliefs about them (e.g., how well do your parents think you do in math). The items on the questionnaire have been tested extensively with large groups of children, and more information about them can be obtained from the author.

A major advantage of this study is that a social-psychological theory, expectancy-value theory, can be tested in a real-world achievement setting, children's beliefs about their math and English courses. I will focus on two sets of results here: 1) gender and grade differences in children's achievement beliefs to look again at whether children's beliefs decline as reported in earlier work, and 2) further tests of Eccles et al.'s expectancy-value model of achievement beliefs, including assessments of longitudinal relationships among the variables, to


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establish which of the beliefs appear to be the most critical mediators of children's performance and persistence.

## Results

Analysis of variance and t-tests were used to assess gender and grade level differences in children's achievement beliefs. We begin with gender differences.

### Gender Differences

Table 1 presents a summary of the gender differences in math and English beliefs in year 1. The general pattern of results was for boys to have more positive beliefs about math, and girls to have more positive beliefs about English. Looking first at math, compared to girls boys rated math as easier, had higher expectancies both for their current and future math courses, believed they have more math ability, that math was more important for them, and generally more useful for men. Girls stated they had to try harder to do well in math, that it cost more for them to do well, and that math was more difficult for them. However, they did feel that math was more useful for women than did boys, and they also reported being more interested in math than did boys, though this difference only reached the .05 level of significance.

On some important measures, no gender differences were found. Boys and girls thought they were performing at similar levels in math, though actually girls' grades in math were better than boys' grades. Their beliefs about how much effort and ability are required to do well in math were similar, as were beliefs about the importance of math. They believed they received similar amounts of encouragement from their parents, and that their parents thought they were equally able in math. Perhaps most important, there were no gender differences in intentions to take more advanced math courses, or in valuing of math.

Generally, these results are similar to those reported in Eccles et al.'s earlier work, except that in the earlier study boys and girls did not differ in their current math expectancies. These results indicate that boys have more positive beliefs about math, even though girls actually were outperforming boys in math in this sample. This fact makes the differences even more striking, since boys maintain their more positive attitudes even though they weren't doing as well as girls. As has been noted in other work, boys tend to be overly optimistic about their performance.

The results for math contrast quite clearly with the results concerning English. Girls' beliefs about English were much more positive, even more positive than boys' beliefs about math. Compared to boys, girls had higher expectations for their current and future English courses, thought English more interesting and important and so valued it more, believed they had more ability


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in English and that they were performing better. They also had stronger intentions to take more English classes. Boys believed English was harder for them in their current English course, and would be so in the future. They also thought English required more effort from them.

In many ways, these results are a mirror image of those from the math items, though actually girls were more positive about English than boys were about math. Girls value English more and think they are better at it, whereas boys think they are better at math and tend to value it more. These differences are reflected in students' intentions to take more courses in these subject areas (for English at year 1 and math at year 2).

What about year 2 differences? Many were quite similar. Boys continued to have more positive beliefs about mathematics, and girls about English. However, the more intriguing pattern was that for the math beliefs, the differences between boys and girls were somewhat more substantial, whereas in English, the differences were less strong. For instance, girls and boys reported similar intentions to keep taking math in year 1, but at year 2 girls' intentions to take more math were weaker than boys' intentions. In English, in year 1 boys' ability perceptions and expectancies in English were lower than those of girls, but this was not the case in year 2. So math differences tended to increase and English differences to decrease, indicating that overall boys' attitudes were becoming more positive relative to girls' attitudes.

Grade Level Differences

Year 1. To simplify and clarify examination of the grade differences in children's responses, three groupings of children at year 1 were created: those in elementary school, junior high, and high school. These same groups were followed into year 2. This grouping was done in order to reduce the number of comparisons, and because the groupings represent naturally-occurring groups in the school population. Significant grade-level differences in children's beliefs about math and English are presented in Table 2. Because of the large number of comparisons, only differences attaining the .01 level of significance will be highlighted.

In general, children's beliefs about math were less positive at each successive grade level. The most common pattern was for the elementary and junior high school groups to be similar in their beliefs, and both of those groups to have more positive beliefs than the high school group. This pattern was obtained on the following variables: perceptions of math ability, math performance, the combination of performance and ability perceptions, current difficulty of math, the combination of actual and required effort to do well in math, and three composite measures: ability concept, task difficulty, and value concept. Thus on a constellation of ability, effort, task



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difficulty, and task values variables, high school-aged students were more negative in their beliefs than were the other two groups.

A second common pattern was for the elementary school group to have more positive beliefs than the other two groups, and the junior high school group to have more positive beliefs than the high school group. This pattern was obtained on the following variables: ability required to do well, actual effort, usefulness of math, usefulness of advanced math for women, and perhaps most important, intentions to take more math. When differences occurred between only the elementary school and junior high school groups, the elementary group was more positive in their beliefs, and this was the case on the current expectancies scale.

The three age groups did not differ on several of the scales, including future math expectancies and future difficulty of math, and interest and importance of math. Though younger children had higher current expectancies and thought their current math course easier, they were more cautious in future expectancies and difficulty estimates, and so did not differ from the other groups on these measures. The results on the interest and importance variables show that though there were grade differences on the composite value concept, on two important indicators of that construct the grade groups did not differ. Older students were more pessimistic about their math ability and thought it harder, yet they continued to think math an important subject and one they were interested in.

These results are similar to those reported by other researchers (e.g., Eccles et al., 1983; Simmons et al., 1973). Children's beliefs were less positive at the upper grade levels. One reason for this certainly is that math courses become more difficult, and the grade level differences likely reflect students' realistic assessements of this increasing difficulty. However, the results also indicate that the older students overall valuing of math is weaker. This is true even though the students at the upper grades are taking math by their own choice, and so those students least interested and able in math probably have stopped taking math courses. Even among this more select group of students there is more pessimism and lower valuing of math.

Though there is evidence for older children being more pessimistic, the differences in this study are less strong than in Eccles et al.'s earlier work, and in Simmons et al.'s work. This is particularly true for the differences between elementary and junior high school students; in the earlier studies great differences were reported between sixth and seventh grade students' beliefs, with seventh graders being more pessimistic. The stronger differences in this sample were between the senior high group and the other two groups. This is further substentiated by a longitudinal assessment of the differences

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between children at sixth grade in year 1 and seventh grade in year 2; their beliefs were more similar than different.

Results pertaining to English (shown in Table 3) show quite a different pattern. When significant differences were obtained on the English scales, they favored the high school group in almost every case. High school students' English ability perceptions, expectations for success, and beliefs about the usefulness of English were more positive than those of both the junior high school and elementary school groups. Their perceptions of how well they were doing in English also were more positive than elementary school students' perceptions. There was a trend for the senior high school students to be more interested in English as well. Junior high school students were more positive than elementary school students concerning their ability in English, English performance and expectancies for success. There were no grade-related differences on the current difficulty, required effort, or task and value concept variables.

These results are markedly different from the math results, and demonstrate the need to look at beliefs about individual subject areas separately. Children do not appear to become more negative about their ability and performance in English as they do in math. This pattern is perhaps due more to girls' beliefs; as we have seen girls tend to be more positive about English. However, boys' beliefs about English generally are not different in the different grade groups, and often they became more positive too. Perhaps English classes do not become as difficult as math classes do in secondary school. Or perhaps English remains a more interesting subject, as students explore new and possibly exciting materials, such as novels, plays and poetry. English classes in elementary school stress grammar drills, spelling and rote learning more, whereas English in secondary schools may allow students to explore new and different ideas. Math becomes increasingly difficult and rigorous in junior and senior high school, and many students find it hard to continue doing well. Math skills are cumulative, and doing poorly one year will make it quite difficult to do well the next year. In contrast, particularly in high school, English does not follow this pattern of increasing difficulty and skills from the previous year being critical for current success. In any case, it is quite clear that students' beliefs about English are more positive; this can also be seen by comparing the magnitudes of the mean scores on the math and English belief variables. The means on the English beliefs are generally higher.

Year 2. Overall, the differences between the three groups (now 6th and 7th; 8th, 9th and 10th; and 11th and 12th graders) were less numerous in year 2 than in year 1. As in year 1, the differences found in children's math beliefs showed that younger children had more positive beliefs than did older children. The most common pattern was for the younger group to have more positive beliefs than both the middle and older groups, and the middle and older groups to be similar in their beliefs. This



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pattern occurred on the following variables: cost of doing well in math, usefulness of advanced math, the task difficulty composite measure, and intentions to take more math. Another pattern was for the younger and middle groups to be the same, and both those groups holding more positive beliefs than the oldest group. This was the case on the current expectancies and required ability variables.

So although the trend was similar at year 2, there were noticeably fewer differences between the groups. For instance, on important variables such as math ability and perceived performance in math, math value, interest and importance in math, and effort needed to do well, there were no differences. This seems to be due to the fact that the youngest group, now with half the children in junior high, was less positive than they were at year 1.

Turning to children's beliefs about English, the two most important points are that the younger group was again more negative in their beliefs about English, and there were fewer differences at year 2 than at year 1. The most prevalent pattern was for the younger group to be more negative than both the middle and older group, with the middle and older groups similar in their beliefs. This pattern was obtained on the current expectancies, perceived ability and perceived performance, and plans to take more English variables. The only measure on which the younger group was more positive was the importance of English variable; both the younger and middle groups believed English was more important than did the older group. So once again the same two patterns held: when differences were obtained on the English variables, they favored the older children. However, as with the math variables in year 2, there were fewer differences on the English variables in year 2 than year 1.

Modeling Analyses

Along with assessing individual differences in the constructs, we are interested in assessing which of children's achievement beliefs relate most strongly to children's performance in and choice of math and English courses. We have used path analysis for this purpose. Path analysis is a technique based on multiple regression that provides estimates of direct and indirect relationships among variables, and so can be used to test causal links in theoretically derived models. Each variable is regressed on the set of variables preceding it in the model. The analyses I will discuss here build on those reported by Eccles et al. (1983), and differ from the earlier analyses in the following ways: First, we focused solely on children's beliefs, rather than on both children's beliefs and their perceptions of their parents' beliefs, in order to assess comparable models in math and English, since children did not report on their parents' beliefs about their English performance. Second, to expand on Eccles et al.'s earlier work, we have looked at longitudinal relationships among various constructs, rather


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than just within-year relationships. Third, because children's courses in math and English become very diversified in secondary school, and so performance indicators will vary greatly, we look here only at 5th through 8th grade children in year 1.

The model we assessed included as exogenous variables children's gender and performance in math or English before the study began. The endogenous variables include locus of control and sex role identity, which are part of the child's general self-schemata. These variables mediate the more particular ability perception and task difficulty perception constructs, which in turn mediate expectancies and values. Expectancies and values predict intentions to continue taking math or English, and course grades.

Figure 2 presents the reduced path model for the year 1 math variables, with only the significant paths retained. The R-squared under each variable represents the amount of variance in that variable accounted for by the other variables to the left. As can be seen in the figure, 33% of the variance in intentions to take more math was accounted for in the model, and 46% of the variance in performance at year 1. Both expectancies and values were significantly related to intentions to take more math, with the values construct showing the stronger relationship. However, more of the variance in expectancies was accounted for by the variables specified in this model than was the variance in task value. Ability perceptions related strongly to task value and particularly to expectancies, as predicted. However, task difficulty perceptions were not directly related to any other constructs. Children's sex-role identity, with higher scores meaning endorsing the more masculine items, related positively to ability perceptions and negatively to task difficulty beliefs. This pattern means that children with a more masculine sex-role identity had more positive ability perceptions, and thought math easier. On the locus of control construct, a more internal locus of control was related positively to ability perceptions. Children's previous performance in math was related directly and strongly to their ability perceptions and (negatively) to task difficulty perceptions, as well as to grades in math at the end of year 1.

Many of the links in the model receive support in this analysis, with the weakest predictors being the two more general self-schemata measures, and also task difficulty. There is clear correspondence between results of this analysis and the analysis reported by Eccles et al. (1983): the R-squared for the intention variable is quite similar in both analyses. Values related more strongly to intentions than did expectancies in both analyses, but more of the variance in expectancies was accounted for. Ability beliefs were a much stronger predictor variable than were task difficulty perceptions.

Turning to the year 2 variables, many similar patterns emerged: values predicted intentions more strongly than did



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expectancies, but more of the variance in expectancies was predicted. Ability perceptions related more strongly to expectancies and values than did task difficulty perceptions. Concerning direct relationships between year 1 and year 2 constructs, the strongest relationships were between like constructs (e.g., ability perceptions at year 1 and ability perceptions at year 2, etc.). As perhaps would be expected, there were few direct relationships between, for instance, ability perceptions at year 1 with expectancies at year 2. Of course, it would be expected that these effects would be indirect.

To summarize, many of the major tenets of the model received support. Children's expectancies for success and particularly their task value relate to their intentions to take more math, whereas ability perceptions are strongly related to both expectancies and values. Achievement values have been a relatively neglected construct in the achievement literature, with much more attention paid to ability beliefs and expectations for success. However, in this field-based study of children's beliefs about school subjects, values emerged as a stronger predictor variable of intentions to take more math than did expectancies for success, and as noted earlier, this was also the case in Eccles et al.'s earlier study.

Though values play an important role in intentions, we have not accounted for a great deal of the variance in task value with the predictor variables included in the model. The general self-schemata constructs that were predicted would relate to task value did not do so. We are currently examining whether other constructs, such as the importance parents attach to math, may account for more of the variance in task value.

English

The analyses of the English beliefs produced results similar to those for math. Value of English was a stronger predictor of plans to take more English than were expectancies for success in English, but more of the variance in expectancies was accounted for by the variables in the model. Ability perceptions were a stronger mediator of both values and particularly of expectancies than were English task difficulty perceptions. At year 2, again values were a stronger predictor of intentions than were expectancies, and ability perceptions strongly precdicted expectancies. As with the math variables, most of the year 1 to year 2 relationsips were between like constructs. So as was the case with the math-related beliefs, task value was a stronger predictor of intentions to keep taking English, but more of the variance in expectancies was explained by the constructs in the model.



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## Discussion

Explanations for the findings have been made throughout this paper, so I will conclude with some general summary remarks. First, this work (and the earlier study of Eccles et al.) shows in more depth and detail than previous work how girls and boys differ in their achievement beliefs about math and English. While girls are less positive about math, boys are less positive about English. This field-based study indicates that children's ability perceptions and task values are key achievement beliefs as far as predicting intentions to keep taking math or English, and that boys have more positive ability perceptions for math than do girls, and girls have more positive ability perceptions than do boys in English. Other beliefs such as task difficulty perceptions and expectancies seem to be less powerful mediators of children's intentions to continue taking math (or English) courses.

Much has been written about ability perceptions, and we have heard today about different factors influencing children's ability perceptions about activities in different domains. We know less about how children come to value some tasks and not others. It does appear that ability perceptions relate to task value, so that children do value those tasks on which they think they are more able. However, in these analyses difficulty of the task did not relate strongly to values. ALso, the sex-role identity measure did not predict task value.

We are currently examining how socializers may influence children's valuing of different tasks; what messages do parents communicate to boys and girls about which school tasks should be more important to them? Eccles et al. (1983) and Jayaratne (1983) have reported that though parents think boys and girls have similar ability in math, they believe girls have to try harder to do well and that math is harder for girls. We are examining whether and how parents may communicate such messages to children, perhaps leading girls to value math less. As we have noted, achievement values has been a relatively neglected construct in the achievement motivation literature. Given its importance as a predictor variable in this study, we clearly need to know more about the determinants of task value.

The grade level differences show that children are more pessimistic and negative about math at the later grades. We suggested earlier that this could be due in part to the fact that math courses get increasingly difficult and so students' pessimism may be an accurate reflection of such changes. But also, the changes in the school environment that occur in secondary school likely play a role as well; particularly changes that lead to greater emphasis on competition, social comparison and outperforming others. It seems that there is a general change from a task mastery focus in elementary school to a more ability-oriented focus in junior high school, and this change can create problems for many students. As others in this symposium



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have mentioned, several members of this research group are currently conducting a comprehensive study of how the transition from elementary to junior high school influences children's beliefs, and what kinds of practices at the junior high level make it either easier or more difficult for children to maintain more positive beliefs. This study will test many of the hypotheses discussed here about how the transition to junior high influences children's beliefs.

While students become more pessimistic about math, their beliefs about English actually became more optimistic. This finding suggests that English classes in junior and senior high are enjoyed more by students than math classes. The reasons for this are not completely clear. Is there less social comparison and competition in English, and a greater concern for task mastery? Is it that English classes do not get progressively more difficult, but instead allow children to explore new and different ideas? Most of the observational work done in secondary school classrooms has been done in math classes, and there is a need for such data from English classes so that clearer comparisons and contrasts can be made. But it is fortunate that children do not become more negative about all academic subjects; rather, it seems that mathematics is the key problem area, particularly for girls.



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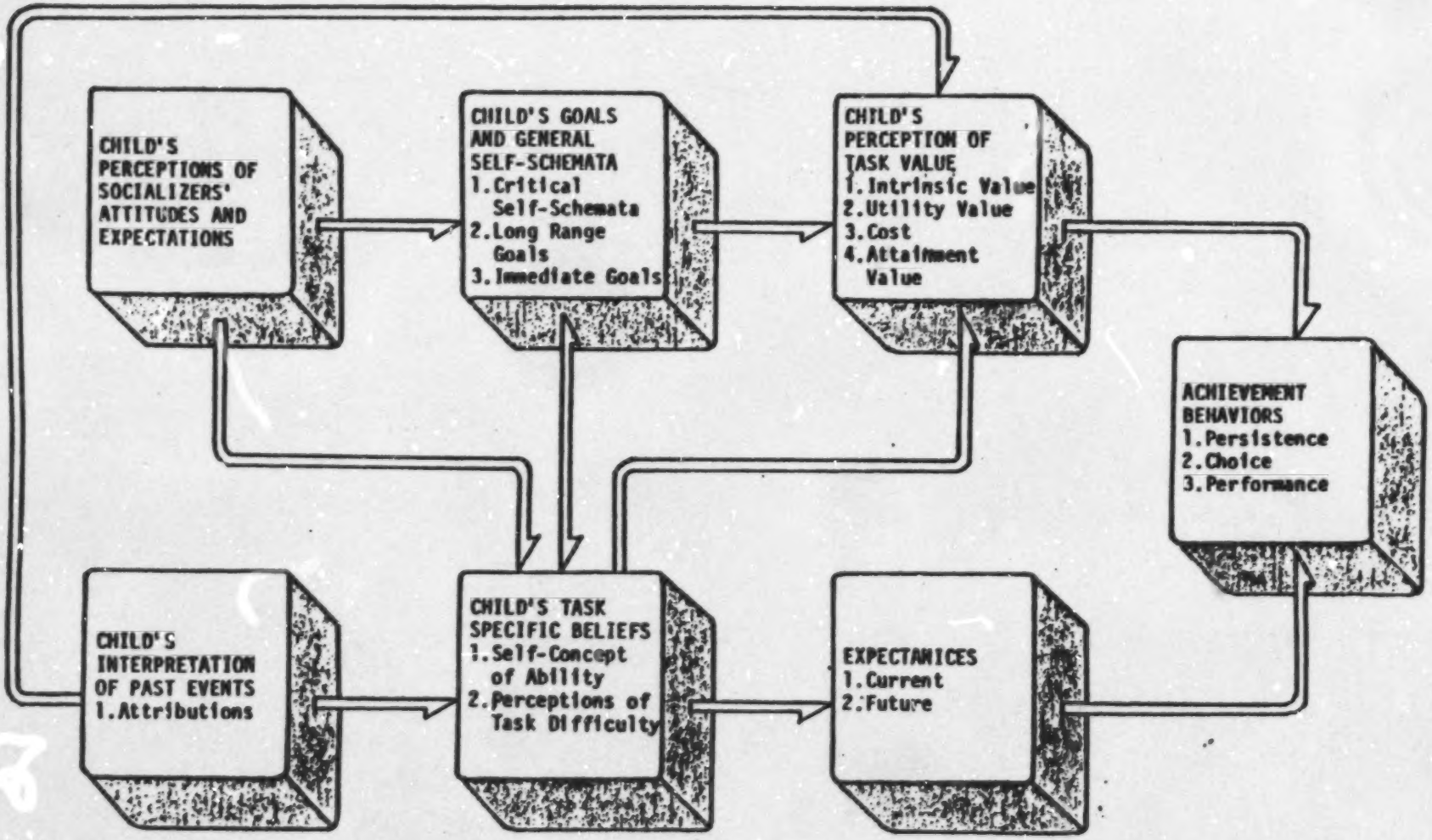


Figure 1

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Table 1

Gender Differences in Children's Math and English Beliefs

| Math Variables | N | M |
|---|---|---|
| Current Difficulty | | |
| Females | 366 | 3.82 |
| Males | 376 | 3.53 |
| Current Expectancies | | |
| Females | 366 | 4.98 |
| Males | 376 | 5.24 |
| Future Expectancies | | |
| Females | 318 | 4.78 |
| Males | 330 | 5.17 |
| Combined Expectancies | | |
| Females | 318 | 4.88 |
| Males | 330 | 5.22 |
| Ability Perceptions | | |
| Females | 366 | 4.75 |
| Males | 376 | 5.02 |
| Actual Effort | | |
| Females | 366 | 4.55 |
| Males | 376 | 4.29 |
| Cost to Do Well in Math | | |
| Females | 366 | 3.03 |
| Males | 376 | 2.84 |

Table 1 (cont.)

| | N | M |
|---|---|---|
| Usefulness of Advanced Math for Women | | |
| Females | 363 | 4.89 |
| Males | 371 | 4.38 |
| Boys Better at Math | | |
| Females | 365 | 3.96 |
| Males | 376 | 4.36 |
| Math Task Difficulty Concept | | |
| Females | 366 | 4.40 |
| Males | 376 | 4.19 |
| Math Ability Concept | | |
| Females | 366 | 4.90 |
| Males | 376 | 5.12 |
| English Variables | | |
| Current Difficulty | | |
| Females | 360 | 3.36 |
| Males | 377 | 3.79 |
| Current Expectancies | | |
| Females | 362 | 5.42 |
| Males | 377 | 5.15 |
| Performance Perceptions | | |
| Females | 362 | 5.80 |
| Males | 377 | 5.57 |
| Required Effort in English | | |
| Females | 362 | 4.25 |
| Males | 377 | 4.61 |



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Table 1 (cont.)

| | N | M |
|---|---|---|
| Interest in English | | |
| Females | 362 | 4.46 |
| Males | 377 | 3.71 |
| Importance of English | | |
| Females | 362 | 6.16 |
| Males | 377 | 5.84 |
| English Task Difficulty Concept | | |
| Females | 362 | 4.13 |
| Males | 377 | 4.39 |
| English Value Concept | | |
| Females | 362 | 5.28 |
| Males | 377 | 4.83 |
| English Ability Concept | | |
| Females | 362 | 5.35 |
| Males | 377 | 5.11 |
| Intentions to Take More English | | |
| Females | 362 | 5.60 |
| Males | 376 | 5.09 |



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Table 2

Grade Level Differences in Children's Achievement Beliefs*

| Math Variables | N | M |
|---|---|---|
| Current Difficulty | | |
| 5th-6th | 175 | 3.40[b] |
| 7th-9th | 296 | 3.53[c] |
| 10th-12th | 271 | 4.01 |
| Future Difficulty | | |
| 5th-6th | 175 | 4.76 |
| 7th-9th | 296 | 4.99 |
| 10th-12th | 169 | 5.04 |
| Current Expectancies | | |
| 5th-6th | 175 | 5.41[a,b] |
| 7th-9th | 296 | 5.10 |
| 10th-12th | 271 | 4.95 |
| Combined Expectancies | | |
| 5th-6th | 175 | 5.20[b] |
| 7th-9th | 296 | 5.06 |
| 10th-12th | 177 | 4.90 |
| Ability Perceptions | | |
| 5th-6th | 175 | 5.89[b] |
| 7th-9th | 296 | 4.97[c] |
| 10th-12th | 271 | 4.67 |
| Performance Perceptions | | |
| 5th-6th | 175 | 5.40[b] |
| 7th-9th | 294 | 5.28[c] |
| 10th-12th | 271 | 4.90 |

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Table 2 (cont.)

| | N | M |
|---|---|---|
| **Performance and Ability Perceptions** | | |
| 5th-6th | 175 | 5.25[b] |
| 7th-9th | 296 | 5.14[c] |
| 10th-12th | 271 | 4.79 |
| **Effort Required to Do Well** | | |
| 5th-6th | 175 | 4.84 |
| 7th-9th | 296 | 4.62[c] |
| 10th-12th | 271 | 5.08 |
| **Actual Effort** | | |
| 5th-6th | 175 | 4.21[a,b] |
| 7th-9th | 296 | 4.46 |
| 10th-12th | 271 | 4.52 |
| **Ability Required to Do Well** | | |
| 5th-6th | 175 | 4.15[a,b] |
| 7th-9th | 296 | 3.71[c] |
| 10th-12th | 271 | 3.07 |
| **Usefulness of Advanced Math for Women** | | |
| 5th-6th | 174 | 5.19[a,b] |
| 7th-9th | 290 | 4.72[c] |
| 10th-12th | 270 | 4.18 |
| **Usefulness of Advanced Math for Men** | | |
| 5th-6th | 174 | 5.62[b] |
| 7th-9th | 296 | 5.56[c] |
| 10th-12th | 271 | 5.20 |

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Table 2 (cont.)

| | N | M |
|---|---|---|
| Boys Better at Math | | |
| 5th-6th | 175 | 4.21 |
| 7th-9th | 295 | 4.08 |
| 10th-12th | 271 | 4.24 |
| Combined Effort | | |
| 5th-6th | 175 | 4.56[b] |
| 7th-9th | 296 | 4.54[c] |
| 10th-12th | 271 | 4.83 |
| Usefulness of Advanced Math | | |
| 5th-6th | 175 | 4.90[a,b] |
| 7th-9th | 296 | 4.37[c] |
| 10th-12th | 271 | 3.90 |
| Math Task Difficulty Concept | | |
| 5th-6th | 175 | 4.92[b] |
| 7th-9th | 296 | 4.18[c] |
| 10th-12th | 271 | 4.52 |
| Math Value Concept | | |
| 5th-6th | 175 | 5.25[b] |
| 7th-9th | 296 | 5.08[c] |
| 10th-12th | 271 | 4.89 |
| Math Ability Concept | | |
| 5th-6th | 175 | 5.21[b] |
| 7th-9th | 296 | 5.07[c] |
| 10th-12th | 271 | 4.83 |

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Table 2 (cont.)

| | N | M |
|---|---|---|
| Intentions to Take More Math** | | |
| 5th-6th | 175 | 5.15 |
| 7th-9th | 296 | 5.79 |
| 10th-12th | 252 | 6.24 |

* All differences significant at the .01 level.
  - [a] 5th-6th significantly different from 7th-9th
  - [b] 5th-6th significantly different from 10th-12th
  - [c] 7th-9th significantly different from 10th-12th

** On this variable, lower scores mean stronger intentions to take more math



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Table 3

Grade Level Differences in Children's Achievement Beliefs*

English Variables

| Current Expectancies | N | M |
|---|---|---|
| 5th-6th | 173 | 5.01[a,b] |
| 7th-9th | 296 | 5.23[c] |
| 10th-12th | 270 | 5.53 |
| **Ability Perceptions** | | |
| 5th-6th | 173 | 4.74[a,b] |
| 7th-9th | 296 | 5.04 |
| 10th-12th | 270 | 5.15 |
| **Performance Perceptions** | | |
| 5th-6th | 173 | 5.51[a,b] |
| 7th-9th | 296 | 5.69 |
| 10th-12th | 270 | 5.79 |
| **Usefulness of English** | | |
| 5th-6th | 172 | 4.84 |
| 7th-9th | 296 | 4.77[c] |
| 10th-12th | 269 | 5.19 |
| **Interest in English** | | |
| 5th-6th | 173 | 3.83[b] |
| 7th-9th | 296 | 4.03 |
| 10th-12th | 270 | 4.29 |
| **Importance of English** | | |
| 5th-6th | 173 | 6.37[b] |
| 7th-9th | 296 | 6.18[c] |
| 10th-12th | 270 | 5.55 |



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Table 3 (cont.)

| | N | M |
|---|---|---|
| English Ability Concept | | |
| 5th-6th | 173 | 5.02[a,b] |
| 7th-9th | 296 | 5.25 |
| 10th-12th | 270 | 5.34 |
| Intentions to Take More English | | |
| 5th-6th | 172 | 4.62[a,b] |
| 7th-9th | 296 | 5.44 |
| 10th-12th | 270 | 5.67 |

*All differences significant at the .01 level

[a]5th-6th significantly different from 7th-9th
[b]5th-6th significantly different from 10th-12th
[c]5th-6th significantly different from 10th-12th



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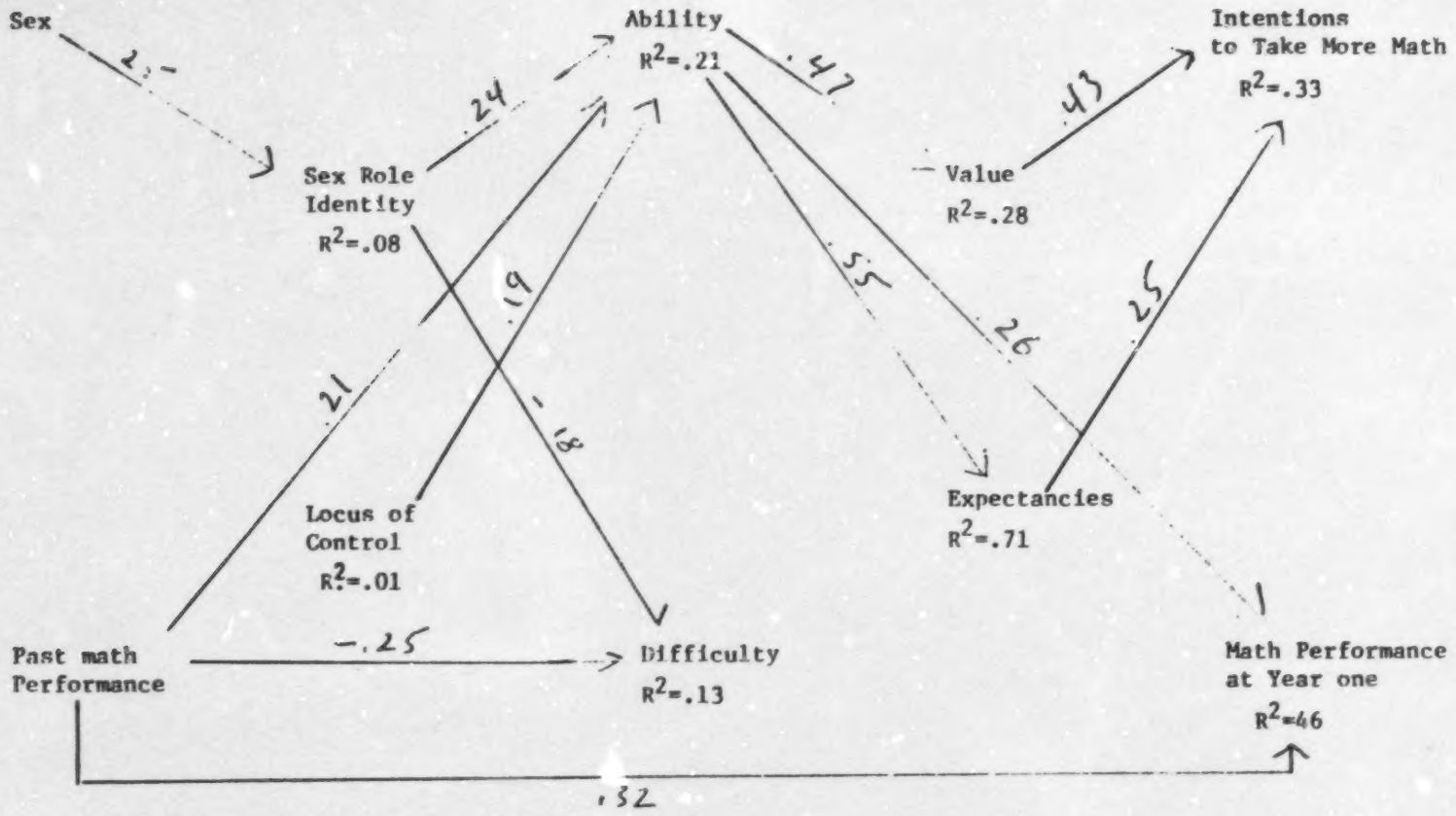


Figure 2

Expectancy-Value Model of Student Attitudes, Year 1



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